



FIVE-YEAR REVIEW REPORT

**Waite Park Water Supply Site
Waite Park, Minnesota**

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I. PURPOSE

The Minnesota Pollution Control Agency (MPCA) staff has completed a Five-Year Review of the Remedial Action (RA) conducted at the Waite Park Ground Water Contamination site, Waite Park Minnesota. This review evaluates whether the RA remains protective of public health, welfare, and the environment.

Section 121(c) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and Section 300.430(f)(4)(ii) of the National Oil and Hazardous Substance Contingency Plan (NCP), require that periodic (no less often than five years) reviews are to be conducted for sites where hazardous substances, pollutants, or contaminants remain at the site above levels that will not allow for unlimited use or unrestricted exposure following the completion of all RAs for the site.

OSWER Directive 9355.7-02 (Structure and Components of Five-Year Reviews, May 23, 1991.) provides that the U.S. Environmental Protection Agency (EPA) will conduct a Statutory Review of any site at which a post-SARA remedy, upon attainment of the Record of Decision (ROD) cleanup levels, will not allow unlimited use and unrestricted exposure; and a Policy Review of (1) sites where no hazardous substances will remain above levels that allow unlimited use and unrestricted exposure after completion of the RA, but the cleanup levels specified in the ROD will require five or more years to attain, or (2) sites addressed pre-SARA at which the remedy, upon attainment of the ROD cleanup levels, will not allow unlimited use and unrestricted exposure. The Five-Year Review of the Waite Park Ground Water Contamination site RA was conducted in accordance with this policy.

EPA has established a three-tier approach to conducting Five-Year Reviews, the most basic of which provides a minimum protectiveness evaluation (level I review). EPA determines the level of the review based on site-specific considerations including the nature of the response action, the status of on-site response activities, and proximity to populated areas and sensitive environmental areas. A level I review was conducted at the Waite Park Ground Water Contamination site and consisted of (1) a review of all documents associated with the RA and (2) a site visit.

The Waite Park Ground Water Contamination site consists of three individual sites: the city of Waite Park (City) water supply wells; the Electric Machinery (EM) site; and the Burlington Northern Car Shop (BN) site. The RA for the City water supply wells consisted of the installation of a packed tower aeration unit to remove the contaminants from the City water supply. The RA for the EM site, conducted in accordance with the January 5, 1989, EM site ROD, consisted of the treatment of the shallow and deep aquifers by installing pump-out wells, packed tower aeration treatment, and discharge of the treated water to the Sauk River. The RA for the BN site is currently being implemented in accordance with the July 14, 1994, BN site ROD, which specifies stabilization/solidification and on-site containment of contaminated soils and ground water monitoring.

This Five-Year Review is being conducted to determine if the implemented RAs for the City water supply wells and the EM site is adequately addressing the shallow and deep ground water contamination resulting from the EM site. A Five-Year Review will be conducted separately for the BN site within five years after implementation of the BN RA.

II. SUMMARY OF SITE CONDITIONS

A. Site Background

As indicated above, the Waite Park Ground Water Contamination site consists of three individual sites: the City water supply wells; the EM site; and the BN site (see enclosed figure). The City water supply wells are located within the BN site, which is a 200-acre parcel of land. The EM site is adjacent to, and north of the BN site, within the city limits of St. Cloud, and consists of approximately 45 acres of land.

In December 1984, volatile organic compounds (VOCs) were found in the City water supply wells. On January 28, 1985, the Minnesota Department of Health (MDH) informed the MPCA staff that the City was being advised to discontinue use of its water supply as soon as possible due to unacceptable levels of hazardous substances in their drinking water. Consequently, on January 28, 1985, the MPCA Director determined that an emergency existed with regard to the City water supply. The MPCA Director issued a Determination of Emergency to allow use of the Minnesota Environmental Response and Compensation Fund to take necessary actions to provide the City with a safe drinking water supply and to undertake an investigation and Feasibility Study (FS) to determine the most appropriate long-term drinking water alternative. Initial provisions were made for temporary supply of safe drinking water from nearby St. Cloud businesses, and on February 4, 1985, an emergency hookup between the City and St. Cloud water systems was made to supply the City with safe water until the most appropriate long-term water supply system, selected through the conduct of a FS, could be installed. On March 19, 1985, the Waite Park Ground Water Contamination site received a Hazard Ranking System (HRS) Score of 32 and was subsequently placed on EPA's National Priorities List (NPL) of abandoned or uncontrolled hazardous waste sites, making the site eligible for investigation and cleanup under federal Superfund.

The MPCA staff also conducted a limited remedial investigation to determine the source of the ground water contamination. On October 22, 1985, after completion of the initial investigation, the MPCA issued a Request for Response Action (RFRA) to Burlington Northern Railroad Company, citing the BN site as a source of contamination to the City water supply wells. On March 25 and September 26, 1986, the MPCA also issued RFRAs to Brown Boveri & Company Limited, Cooper Industries, Inc.; Dresser Industries, Inc.; and Electric Machinery Manufacturing, Responsible Parties for the EM site. The RFRAs also cited the EM site as a source of contamination to the City water supply wells.

The RFRAs requested both BN and EM Responsible Parties to conduct a Remedial Investigation/Feasibility Study (RI/FS) and implement a Remedial Design/Response Action (RD/RA) Plan for a long-term water supply treatment system for the City. The RFRAs also requested BN and EM Responsible Parties to conduct RI/FS investigations and implement an RD/RA to address the contamination at their respective sites

B. Results of Site Investigations

B. 1. Ground Water.

Across the Waite Park Ground Water Contamination site, a layer of glacial till separates an upper sand and gravel unit from a lower sand and gravel unit. Both units are water bearing aquifers. The glacial till forms the base of the upper aquifer and generally acts as an aquitard, which limits flow of ground water as well as contaminants into the underlying aquifer. In the southeast part of the EM site, there is a "hole" through the glacial till where the upper and lower aquifers are in contact. This allows contaminants that were released to the upper aquifer at the EM site to migrate from the upper to the lower aquifer. The pumping of the municipal wells has an immediate hydraulic effect on the lower aquifer wells and also affects ground water flow in the upper aquifer due to the "hole" in the glacial till. On the southern side of the Waite Park Ground Water Contamination site, the ground water flow in the upper aquifer generally flows north, towards the EM site and the "hole" in the glacial till. Ground water in the lower aquifer flows northeast across the site.

B.1.a. Waite Park Water Supply

Analysis of City water supply samples collected during the initial investigations identified VOC contamination. The types of VOCs detected along with the maximum concentrations detected, as presented in the January 5, 1989, EM ROD, are provided in Table 1 (enclosed). As indicated in Table 1 the contaminants with the highest concentration is tetrachloroethene (PCE) at 680 ug/L, and 1,1-dichloroethane (DCA) at 270 ug/L.

B.1.b. Electric Machinery

Analysis of the ground water samples collected during the Remedial Investigation (RI) for the EM site identified the presence of several VOCs in the shallow and deep aquifers on and off the EM site. As indicated in the Table 1 (attached), the contaminant with the highest on-site concentrations (as presented in the January 5, 1989, EM ROD) is PCE, although trichloroethene (TCE), 1,1,1-trichloroethane (TCA), and cis

and trans-1,2-dichloroethene (DCE) are also present at significant levels. PCE has been found on site in the shallow aquifer at concentrations as high as 34,000 ug/L. The deep aquifer is less severely affected with the highest PCE concentrations of approximately 600 ug/L found in both on and off-site wells.

B.2. Soils.

The soil investigation at the EM site identified some very localized areas of soil contamination. However, no significantly contaminated soil requiring specific RA was identified. Based on the RI, it appears the VOCs that were released on or near the surface and entered the sandy soils underlying the EM site, some of which have since been flushed by precipitation into the shallow ground water or have volatilized into the atmosphere.

III. SUMMARY OF RESPONSE ACTIONS

A. Waite Park Water Supply Wells

A ROD was not executed for the remediation of the City water supply wells. However, in September 1986, the MPCA staff approved an RA for the treatment of the City water supply wells. The RA consisted of the installation of a packed tower aeration system that would remove the contaminants from the water supply. BN and EM Responsible Parties jointly implemented the water treatment system and the City water supply wells were placed back into service in February 1989. The current ground water quality before and after treatment by the packed tower aeration system is shown in Table I. As indicated in Table I contaminant concentrations are still at levels of concern. However, the packed tower aeration system is adequately remediating the ground water for public consumption.

B. Electric Machinery

The EM site investigation was completed and a ROD was issued on January 5, 1989, by the Commissioner of the MPCA, and the EPA Region V, Regional Administrator formally concurred with the selected remedy on September 28, 1989. The remedy implemented at the EM site included the treatment of the shallow and deep aquifers by installing pump-out wells in the contaminated plumes, packed tower aeration treatment of contaminated ground water, and discharge of the treated water to the Sauk River. Implementation of the RA for the deep aquifer was not necessary because it was determined that the EM site contamination in the deep aquifer was within the capture zone of the City water supply wells and the City water supply treatment system was capable of treating the contaminated water. However, monitoring trends indicate that the deep aquifer contamination may be migrating off site, away from the municipal wells.

Therefore, additional measures may be necessary to contain and treat the deep ground water. Table 1 identifies the current ground water quality in the shallow and deep aquifer pump-out wells. In addition, Table 1 provides the treated ground water quality prior to discharge to the Sauk River.

Table 2 summarizes the target cleanup goals as presented in the ROD for the contaminants present in the EM monitoring wells.

IV. REMEDIAL OBJECTIVES

The remedial objectives for the Waite Park Water Supply RA is to protect public health by treating extracted ground water to acceptable drinking water standards prior to public consumption.

The remedial objectives for the EM site is to protect public health and the environment by abating or minimizing the continued migration of VOCs from the EM site through the ground water system. This includes preventing migration of contaminants to the City's municipal wells and by restoring the contaminated aquifer.

V. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) REVIEW

Five-Year Review guidance establishes the policy for EPA to review and analyze the RA at a site as it is affected by newly promulgated or modified federal and state environmental laws. The RA must meet all identified applicable or relevant and appropriate federal and more stringent state requirements. ARARs specified in the January 5, 1989, ROD for the EM site remedy are listed as follows:

A. Source Removal

- A.1. The Resource Conservation and Recovery Act (RCRA; 40 CFR Part 264). Requires removal of all waste residues and soil contaminated with hazardous waste, although the level of decontamination was not defined by RCRA. EPA guidance requires that any contaminants left in subsoils will not impact any environmental media. The ROD indicates that VOCs entering the ground water from the soils will be removed by the shallow aquifer pump-out system. Although the pump-out system removes the contaminants once they reach the ground water, it is possible that contaminants remain in the soils that continue to impact the ground water.

B. Ground Water Pump-and-Treat System

- B.1. Clean Water Act (40 CFR Parts 122 and 125). Treated water discharged to the Sauk River is regulated through the requirements of a National Pollutant Discharge Elimination System (NPDES) permit, which achieves the requirements of this ARAR.

- B.2. Safe Drinking Water Act (SDWA) (40 CFR Parts 141 - 146).** Establishes federal Maximum Contaminant Levels (MCLs) for contaminants in public drinking water supplies. Treated water from the City supply wells is currently in compliance with the MCLs. However, the ground water does not meet this ARAR. Therefore, the pump-out system must, at a minimum, continue to contain the contaminated ground water to prevent the further spread of this contaminant.
- B.3. Minn. Stat. §§ 115 and 116 and Minn. R. ch. 7001 and Minn. R. pt 7050.021.** Regulates discharge of the treated water to the Sauk River under a NPDES permit.
- B.4. Minn. R. pt. 7050.0220.** Requires that discharges to ground water that will be used for consumption attain MCLs and MDH Recommended Allowable Limits (RALs) for contaminants in drinking water. Since the treated water is not discharged to the ground water, this ARAR is not violated.
- B.5. Minn Stat. § 116.07, subd. 4.A.** Regulates air emissions of toxic pollutants. At the time that the ROD was prepared, the operation of the airstripper did not require a permit.
- B.6. Minn Stat. § 105.** Regulates ground water extraction through a Water Appropriation Permit from the Minnesota Department of Natural Resources. The selected alternative meets the requirements of the permit.

Additional ARARs specified in the July 14, 1994, ROD for the BN Site that are relevant to the ground water from the City water supply wells include the following:

- 1. Minn. R. pts. 4717.7100 to 4717.7800.** Establishes Health Risk Limits (HRLs) for ground water contaminants. As discussed under Summary of Response Actions, ground water quality for the City water supply wells does not meet this ARAR.
- 2. Minn. R. ch. 7060.** Establishes uses and the nondegradation goal for ground water, as well as restoration of contaminated aquifers for use as potable water supply. As discussed under the Recommendations Section, questions remain concerning how effective the ground water pump-out systems contain the contaminated ground water plume. Additionally, the water quality of the aquifer renders it unsuitable as potable water source without treatment.
- 3. The MDH RALs for drinking water (Release No. 3, January, 1991) as to-be-considered criteria.** Since the ROD was executed, RALs have been dropped from consideration as to-be-considered criteria with the promulgation of HRLs.

The current remedial performance goals for ground water protectiveness determinations are the MCLs, HRLs, and Minnesota MCLs, which are adopted from the Federal MCLs into state rules. Table 1 identifies the maximum concentrations of VOCs from ground water samples collected from the EM Site and the City water supply wells from December 1993 through November 1994, and the HRLs, Federal MCLs, and the Minnesota MCLs associated with each contaminant. The contaminants found to exceed their respective ground water quality criterion are cis-1,2-dichloroethene, 1,1-dichloroethene, tetrachloroethene, and trichloroethene.

VI. SUMMARY OF SITE VISIT

The Waite Park Ground Water Contamination site was visited on October 28, 1994, and December 6, 1994, by the MPCA's staff. The purpose of the site visit was to determine the current status of the Waite Park Ground Water Contamination site and the adequacy of the site cleanup. Samples were collected from both the City water supply wells and the EM site prior to and after treatment. The analytical results were used in the development of Table 1.

VII. RECOMMENDATIONS

Currently, the EM responsible parties are operating a ground water extraction system in the shallow aquifer consisting of Wells PW-1 and PW-2. Total volumes pumped from these wells have been increased from an average of 7 million gallons (MG) per quarter in 1990 and 1991, to 12 MG in 1993, and finally to 28 MG in the second quarter of 1994. This increased pumping is apparently associated with an eight-fold increase in concentration of total VOCs in PW1 influent. This indicates that the increase of ground water discharge has expanded the capture zone of the wells to include a more highly contaminated portion of the plume.

It is not clear if this is contributing to a decrease in contaminant concentrations farther downgradient of the two pumping wells. VOCs remain at the near-record levels in Well 35S (12,000 µg/L), upgradient of the pumping wells. Because of the recent changes in the pumping rate of Well PW-1, it may be necessary to monitor further before assessing the effectiveness of the current remedy. To ensure that none of the contamination plume is spreading in the upper aquifer, the responsible party shall evaluate the effectiveness of the pump-out system. If this cannot be conducted with the available information, field work shall be performed to provide the information necessary to evaluate the effectiveness of the ground water pump-out system. If the system is not found to provide adequate hydraulic capture of the plume, the pump-out system shall be modified to achieve that objective.

In the deep aquifer, a rise in concentrations in outlying wells (EM20d and EM24d) may signal a movement of VOC contamination off site. A review of ground water contours for this aquifer confirms the presence of a ground water divide in the neighborhood of these wells. The City water supply system strongly controls flow locally, changing the regional ground water gradient in the vicinity of Wells EM20d and EM24d from northeast to southeast. Yet the transient nature of the pumping (off line for up to 12 hours a day) may

allow ground water to flow from the inter-aquifer "hole" towards these two wells and then off site. The original ROD called for the operation of a deep aquifer pump-out well to contain off-site migration. Though this requirement was not implemented because of the belief that the City's municipal system's capture zone included the entire EM site, it may now be necessary to activate a deep aquifer pump-out well. Therefore, the capture zone effectiveness of this system shall be evaluated, as recommended for the shallow aquifer. If the capture zone is found to not adequately contain the plume, the deep aquifer pump-out well shall be activated to provide adequate capture.

The presence of Light Non-Aqueous Phase Liquids (LNAPLs) in Well EM35S has not been accounted for. To ensure proper remediation of all sources of ground water contamination, the nature and extent of the LNAPL shall be determined. If the LNAPL is found to be potentially harmful to human health or the environment, it shall be remediated

The presence of Total Petroleum Hydrocarbons (TPH) in pump-out Well PW-1 requires further characterization. Although the consultant attributes the levels observed to the presence of trichloroethene and tetrachloroethene, it appears that some TPH is present. Therefore, analytical parameters for ground water samples collected from Wells PW-1 and PW-2 shall include Diesel Range Organics (DRO) and Gasoline Range Organics (GRO)

VIII. STATEMENT OF PROTECTIVENESS

The ground water pump-out systems in both the upper and lower sand aquifers are operational and functional. However, increases in the contaminant concentrations in the water pumped from the upper aquifer, and a possible increase in concentrations in monitoring wells in the lower aquifer, indicate the need to reevaluate the effectiveness of both systems in containing the contaminant plume. If the evaluations indicate inadequate capture for either system, it will require modification to ensure the appropriate level of protectiveness.

IX. NEXT REVIEW

It is probable that hazardous substances, pollutants, or contaminants will remain at the Waite Park Ground Water Contamination Site which will not allow for unlimited use or unrestricted exposure. EPA or the MPCA if delegated to do so by EPA will conduct another Five-Year Review by March 31, 1999. This review will be a level I Review, consisting of review of all recent ground water monitoring data and newly promulgated environmental laws.

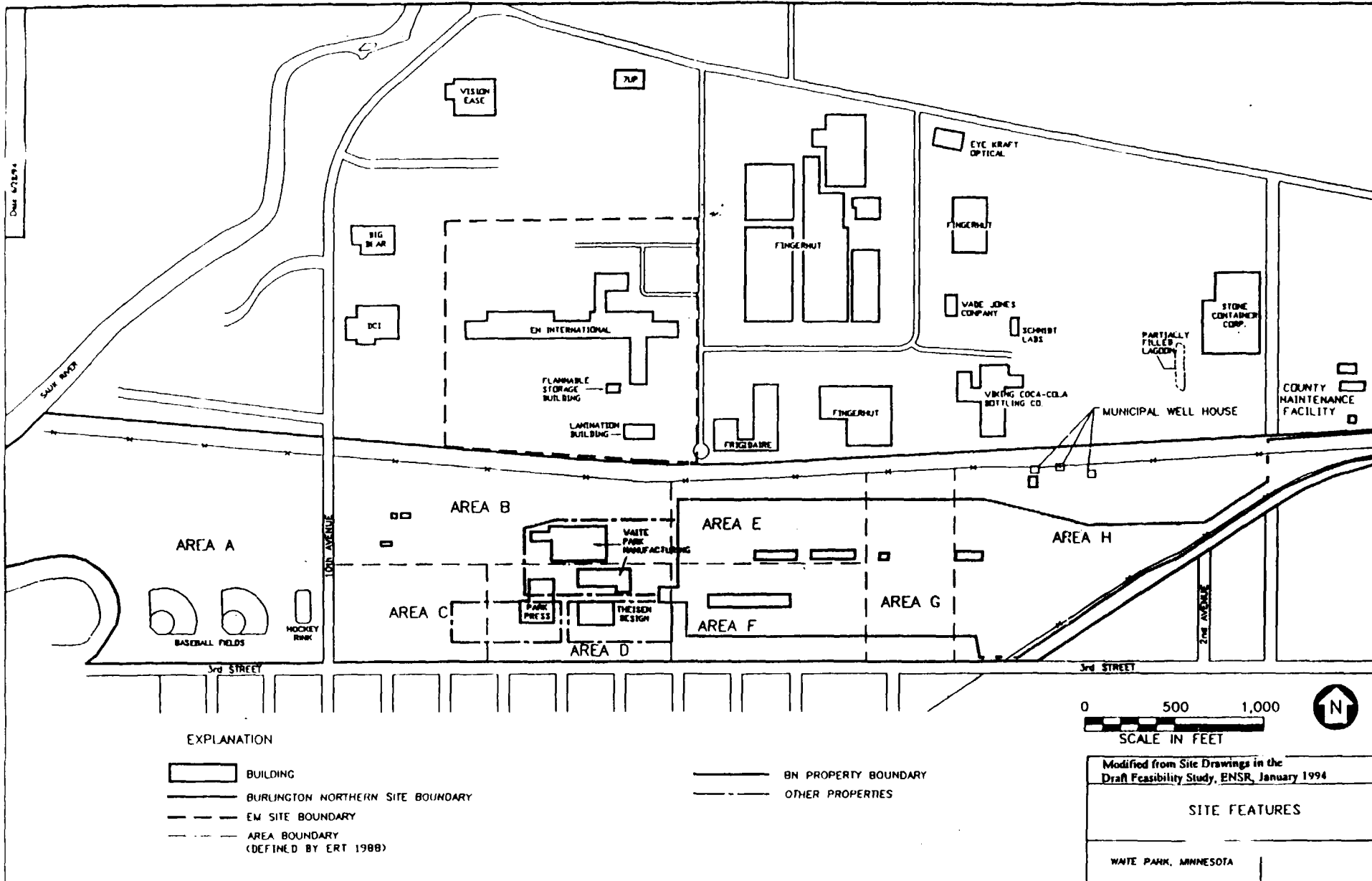


Table 1
Ground Water Quality
Waite Park Ground Water Contamination Site

Chemical Parameter	Waite Park Water Supply			Electric Machinery		
	Max. Detected (from 1/5/89 EM ROD) (ug/l)	Max Detected Before Treatment (Nov. 93 to Dec. 94) (ug/l)	Max. Detected After Treatment (Nov. 93 to Dec. 94) (ug/l)	Max. Detected (from 1/5/89 EM ROD) (ug/l)	Max. Detected Pumpout Wells Before Treatment (Nov. 93 to Dec. 94) (ug/l)	Max. Detected Pumpout Wells After Treatment (Nov. 93 to Dec. 94) (ug/l)
cis-1,2-Dichloroethene	11	<0.2	<0.2	4000	480	1.0
trans-1,2-Dichloroethene		<0.1	<0.1		15	<0.1
1,1-Dichloroethane	270	<0.2	<0.2	380	88	<0.2
1,2-Dichloroethane	7.2	<0.2	<0.2	ND	<0.2	<0.2
1,1-Dichloroethene	94	1.0	<0.5	ND	7.4	<0.5
Tetrachloroethene	680	140	0.7	34000	900	<0.2
1,1,1-Trichloroethane	ND	<0.2	<0.2	1300	24	<0.2
Trichloroethene	60	52	1.1	5100	1800	<0.1
Trichlorofluoromethane	--	1.4	<0.5	--	<0.5	1.0
Various Substituted Benzenes	--	<1.0	<1.0	--	9.0	<0.5
m + p xylene	--	<1.0	<1.0	--	6.7	<0.2
TPH	--	--	--	--	390	7
Vinyl Chloride	--	<0.5	<0.5	--	<0.5	<0.5

NA = Not Analyzed

ND = Not Detected

Table 2
Cleanup Standards

Chemical Parameter	Target Cleanup Level <i>as specified in the 1/5/89 EM ROD</i>		MCL (µg/l)	HRL (µg/l)	MN MCL (µg/l)	Revised Cleanup Goal (µg/l)
	Ground Water	Surface Water				
cis-1,2-Dichloroethene	70	449	70	*70	70	70
trans-1,2-Dichloroethene			100	100	100	100
1,1-Dichloroethane	810	NA	NA	*70	NA	70
1,2-Dichloroethane	NGA	NGA	5.0	NA	5.0	5.0
1,1-Dichloroethene	NGA	NGA	7.0	6.0	7.0	6.0
Tetrachloroethene	6.6	8.9	5.0	*7.0	5.0	5.0
1,1,1-Trichloroethane	200	138	200	*600	200	200
Trichloroethene	5.0	123.0	5.0	*30	5.0	5.0
Trichlorofluoromethane	NGA	NGA	NA	2,000	NA	2000
Xylenes	NGA	NGA	10000	10000	10000	10000
Vinyl Chloride	NGA	NGA	2.0	*0.20	2.0	0.20

MCL = U.S. EPA Maximum Contaminant Level for drinking water

HRL = Minnesota Health Risk Limit

MN MCL = Minnesota Maximum Contaminant Level

NGA = No Goal Assigned

NA Not Available

* Effective December 5, 1994